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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/782,339	02/13/2001	Masahiko Hirose	04558/048001	7852

22511 7590 07/18/2002

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EXAMINER	
MENON, KRISHNAN S	
ART UNIT	**PAPER NUMBER**
1723	6

DATE MAILED: 07/18/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

MF=4

Office Action Summary	Application N .	Applicant(s)	
	09/782,339	HIROSE ET AL.	
	Examiner	Art Unit	
	Krishnan S Menon	1723	

-- Th MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period f r Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *07 January 2002* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☐ Claim(s) *1-20* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-20* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) *4* .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claim 3 rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. Claim 3 recites ratio of ion concentration in "permeate water supplied to the final stage" to "the permeate water not supplied to the final stage" as 1:2 to 1:10. The specification and the examples, however shows that the ion concentration in the permeate water "supplied" to be greater than that of the "not supplied", and, therefore, does not fall in the range in the claim.

Correcting the ratios to 2:1 to 10:1 in the claim would make the specification support the claim. The examiner considered the range of the ratio as 2:1 to 10:1 in claim 3 for examination purposes.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1,4 and 5 are rejected under 35 U.S.C. 102(b) as being clearly anticipated by Tonelly (US 5,997,745).

Tonelly (745) discloses a system comprising a plurality of membrane modules in multistage (Fig 1), each module being spirally wound with polyamide membrane (col 4:26-50); including one final and one pre-final stage with at least a portion of permeate from pre-final stage fed in to the final stage (fig 1; col 4:26-50).

Tonelly (745) also discloses the permeate water fed to the final stage at pH 8.5, as in claims 4 and 5.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* v. *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

1. Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tonelly (745) in view of JP (10-305216).

Tonelly (745) discloses a system comprising a plurality of membrane modules in multistage (Fig 1), each module being spirally wound with polyamide membrane (col 4:26-50); including one

final and one pre-final stage with at least a portion of permeate from pre-final stage fed in to the final stage (fig 1; col 4:26-50; col 3:1-28).

Tonelly (745) fails to disclose mixing the permeate water from the pre-final and final stages before discharging, even though it would be obvious to one of ordinary skill in the art at the time of invention that if Tonelly (745) is sending only part of the permeate from the pre-final stage to the final stage, the other part would be discharged with the final stage permeate water. JP(216) teaches discharging the permeate water from the pre-final and the final stages together, mixed (Fig 2). It would be obvious to one of ordinary skill in the art at the time of invention to chose the JP (216) teaching to mix the pre-final permeate water with the final permeate water of the Tonelly (745) system when only part of the pre-final permeate water is fed to the final stage, because it is alternate but equivalent to the instant application producing equivalent results.

2. Claims 3, 6-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tonelly (745) in view of Bray (US 4,046,685).

Tonelly (745) discloses a system comprising a plurality of membrane modules in multistage (Fig 1), each module being spirally wound with polyamide membrane (col 4:26-50); including one final and one pre-final stage with at least a portion of permeate from pre-final stage fed in to the final stage (fig 1; col 4:26-50). Tonelly (745) also has three pressure vessels in stages.

Tonelly (745) does not teach splitting the permeate stream from the pre-final stage to two and feeding only one of them to the final stage. Tonelly (745) teaches feeding part or all of the pre-final stage permeate to be fed to the final stage. Bray (685) teaches (Fig 1,2 and col 5: 4-35) the splitting of the permeate stream to two separate streams, taking first permeate stream, having a

lower salt content, from the feed (upstream) end and the second permeate stream having a higher salt content from the retentate end. Bray (685) has a string of modules in a housing, connected in series by the permeate tube, with the feed from one end of the housing and the permeate from the other end. His means for splitting the permeate stream blocking the through passage in the permeate tube link at a convenient location inside the housing so that the two permeate streams have a substantially different salt content. The ratio of the salt content in Bray's teachings is 2:1 (Fig 2).

It would be obvious to one of ordinary skill in the art at the time of invention to use the Bray (685) teachings to split the permeate flow from a pressure vessel having a string of modules and then feed only that part of the split flow which has the higher salt concentration to the next/final reverse osmosis membrane stage, if one wants to feed only part of the pre-final permeate stream to the final stage as alternate but equivalent to the teaching of Tonelly (745).

3. Claims 11-16 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tonelly (745) in view of EP(1 136 116 A1).

Tonelly (745) discloses a system comprising a plurality of membrane modules in multistage (Fig 1), each module being spirally wound with polyamide membrane (col 4:26-50); including one final and one pre-final stage with at least a portion of permeate from pre-final stage fed in to the final stage (fig 1; col 4:26-50). Tonelly (745) teaches the apparatus for purifying water with sufficient removal of Boron to get high purity water for industrial applications (col 4:18-26 and examples) with the types of membranes that could be used (col 4: 26-67).

Tonelly (745) does not teach treating seawater in particular and does not disclose the performance values of the membranes used for seawater and for rejection of Boron. EP(116) teaches the types of

membranes to be used, their performance values for seawater and for Boron separation, and particularly, membrane containing Bromine atoms. The membrane performance values in EP (116) are better than 99.5% salt rejection from water at 3.5% salt content at 25C and pH 6.5 with better than 0.m3/m2/day of flux at 5.5 Mpa, and boron rejection better than 92% at 5ppm feed.

It would be obvious to one of ordinary skill in the art at the time of invention to use the membrane taught by (EP (116) with the teachings of Tonelly (745) to have a system which is alternate but equivalent apparatus performing the equivalent function.

4. Claims 17-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tonelly (745) in view of Bray (685) as applied to claim 3 above, and further in view of EP (116).

Tonelly (745) does not disclose treating seawater with his apparatus. EP(116) discloses such an apparatus and membrane that treats the seawater to reduce the TDS sufficiently and Boron to < 1 ppm. One of ordinary skill in the art at the time of invention would chose the membrane taught by EP(116) with the apparatus of Tonelly (745) with an arrangement to split the permeate stream in the pre-final stage as taught by Bray (685) as alternate but equivalent apparatus performing equivalent function.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

1. Uhlinger (US 6,190,556) teaches multistage membrane system with permeate flow split in the pressure vessel.

2. JP (08 206460): seawater desalination with multi stage reverse osmosis membranes

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Krishnan S Menon whose telephone number is 703-305-5999. The examiner can normally be reached on 8:00-4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wanda L Walker can be reached on 703-308-0457. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9310 for regular communications and 703-872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0661.

Krishnan S. Menon
Patent Examiner
July 5, 2002

W. L. WALKER
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